MP MASTER
MA28830

LAMBDA

# INSTRUCTION MANUAL

REGULATED POWER SUPPLIES

## LOD-W SERIES LOD-X SERIES

SPECIFICATIONS AND FEATURES

INSTRUMENT
CAL LAB

DC OUTPUT — Voltage regulated for line and load. For voltage and current ratings see table I below.

TABLE I

| MODEL | VOLTAGE RANGE | MAXIMUM CURRENT (AMPS) AT AMBIENT TEMPERATURE | | |
|---|---|---|---|---|
| | | 40°C | 50°C | 60°C |
| LOD-W-152 | ±12 to ±15 | 3.0 | 2.2 | 1.4 |
| LOD-X-152 | ±12 to ±15 | 2.0 | 1.4 | 0.8 |

Current range must be chosen to suit the appropriate maximum ambient temperature. Current ratings apply for entire voltage range.

REGULATED VOLTAGE OUTPUT (each side)

Regulation (line) ..... 0.15% for input variations from 105-125 or 125-105 volts AC.
Regulation (load) ..... 0.15% for load variations from no load to full load or full load to no load.
Ripple and Noise ..... 1.5mV rms, 5mV peak to peak.
Temperature Coefficient ..... 0.03%/°C
Remote Sensing ..... Provision is made for remote sensing to minimize the effect of power output lead resistance on DC regulation.

OVERSHOOT — No overshoot under conditions of power turn-on, turn-off, or power failure.

AC INPUT — 105-125 or 210-250 volts AC at 47-440 Hz. Standard LOD-W and LOD-X power supplies are factory wired for 105-125 volt input, but can be rewired for 210-250 volt input. See schematic diagram for rewiring of AC input. Input power*: 182 Watts (LOD-W) 135 Watts (LOD-X). Power factor*: 0.7. Ratings apply for 57-63 Hz input. For 47-53 Hz input derate current 10% for each ambient temperature given in table I. For 63-440 Hz input consult factory.
*With output loaded to full current rating and input voltage 125 volts AC, 60Hz.

TRACKING — Absolute difference between negative and positive outputs within 2%; 0.2% change for all conditions of line, load, and temperature.

OVERLOAD PROTECTION — Automatic electronic current tuniting circuit, limits output current to a safe value, protecting load and power supply when overloads and direct shorts occur.

INPUT AND OUTPUT CONNECTIONS — See outline drawing for location.
AC input ..... Terminals on transformer
Ground ..... Terminal on transformer
DC output ..... Turret terminal on printed circuit board
Sensing ..... Turret terminal on printed circuit board

OPERATING AMBIENT TEMPERATURE RANGE AND DUTY CYCLE — Continuous duty from 0°C to +60°C ambient with corresponding load current ratings for all modes of operation.

STORAGE TEMPERATURE — -20°C to +85°C

DC OUTPUT CONTROL — Screwdriver voltage adjust control permits adjustment of DC output voltage. See outline drawing for location of control.

GUARANTEE — 60 day guarantee from date of shipment ..... materials and labor.

PHYSICAL DATA

| | |
|---|---|
| Size | LOD-W: 9" x 4-7/8" x 2-3/4"; LOD-X: 7" x 4-7/8" x 2-3/4" |
| Weight | LOD-W: 7-1/4 lbs. net; 7-3/4 lbs. shipping; LOD-X: 5-3/4 lbs net; 6-1/4 lbs. shipping. |
| Finish | Gray, FED. STD. 595 No. 26081 |

MOUNTING — Three surfaces, each with clearance mounting holes, can be utilized for mounting this unit. Air circulation is required when unit is mounted in confined areas. Refer to Outline Drawing for mounting details.

ACCESSORIES

| | |
|---|---|
| Overvoltage protector | Externally mounted Overvoltage Protector LMOV-3 is available. Additional wire must be added to the Overvoltage Protector leads in order to reach the power supply output terminals. |

## THEORY OF OPERATION

The theory applies to the plus (+) side of the dual output, but is equally applicable to the minus (-) side.

The Lambda power supply consists of a transformer; a bias supply consisting of an auxiliary rectifier and filter; and a main regulator circuit consisting of the main rectifier, filter, and series regulator transistors driven by Integrated Circuit Regulator (IC1). The circuit arrangement is shown in block diagram form, Figure 5.

Single phase input power is applied to transformer T1.

The main rectifier, a full wave rectifier, provides the power which is filtered by capacitor C1 and then regulated via series regulator Q2 and, as applicable, Q3. Auxiliary rectifier CR23 provides voltage filtered by capacitor C2 for regulator control circuits located in IC1.

Voltage tracking of the slave section to the master section is accomplished as follows:

When the master output voltage increases, voltage across R23 and R22 also increases, causing an increase in one input to a comparator located in IC21. The comparator compares this change with the output voltage of the slave unit resulting in an error signal at the output of the comparator. The error signal from the comparator causes the series regulator impedance to decrease. This action increases the slave output voltage.

## OPERATING INSTRUCTIONS

### BASIC MODE OF OPERATION

This power supply operates as a constant voltage source provided the load current does not exceed the rated value at 40°C. For continuous operation, load current must not exceed the rating for each ambient temperature. When rated load current is exceeded, both voltage and current decrease until voltage reaches zero and the current at short circuit is reduced to a safe value.

### CONNECTIONS FOR OPERATION

NOTE: Make all connections to the unit before applying AC input power.

Ground Connections. The Lambda power supply can be operated either with negative, positive, or common output terminal grounded. Use insulated wire whenever any output terminal is connected to ground.

Connection Terminals. Make all connections to the supply at the turret and transformer terminals. Apply input power to transformer terminals. See Outline Drawing for location of terminals.

The supply positive terminal is brought out to terminal +V. The supply common terminal is brought out to terminal COM. The supply negative terminal is brought out to terminal -V. Recommended wiring of the power supply to the load and selection of wiring is shown in figures 1 through 4. Selection of proper wiring is made on the basis of load requirements. Make all performance checks and measurements of current or voltage at the output terminals. Connect measuring devices directly to terminals or use the shortest leads possible.

### SUPPLY LOAD CONNECTIONS

Connections for Operation as a Constant Voltage Source

The output impedance and regulation of the power supply at the load may change when using the supply as a constant voltage source and connecting leads of practical length are used. To minimize the effect of the output leads on these characteristics, remote sensing is used. Recommended types of supply-load connections with local or remote sensing are described in the following paragraphs.

Refer to figure 1 to determine voltage drop for particular cable length, wire size and current conditions. Lead lengths must be measured from supply terminals to load terminals as shown in figure 2.

Local Sensing Connection, Figure 3. Local sensing is the connection suitable for applications with relatively constant load and/or applications using short power output leads.

Remote Sensing Connection, Figure 4. Remote sensing provides compensation for the DC voltage drops in the connecting cables. Sensing leads should be a twisted pair to minimize AC pick-up. A 2.5 mf elect., capacitor may be required between output terminals and sense terminals to reduce noise pick-up.

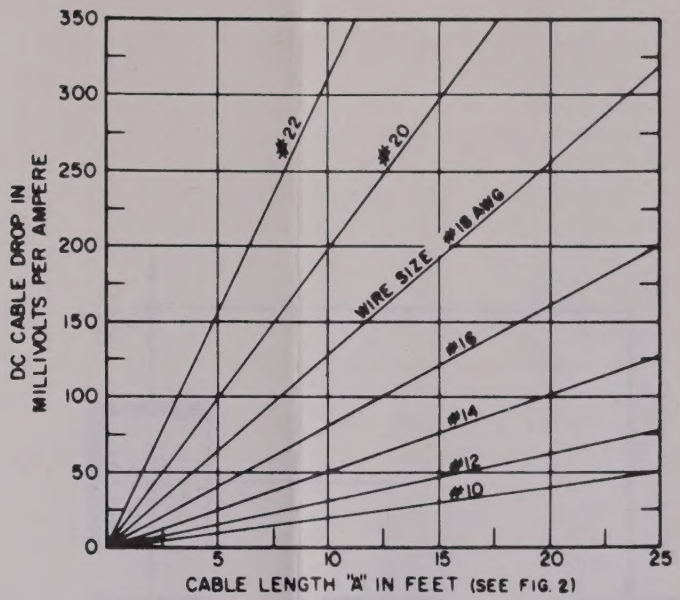


Figure 1. Cable Connection Chart

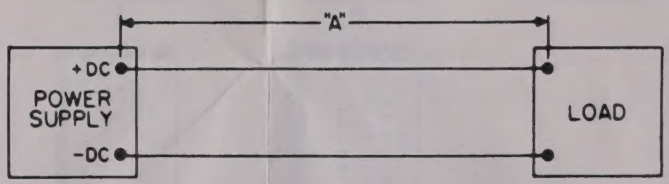


Figure 2. Cable Length "A" in Feet

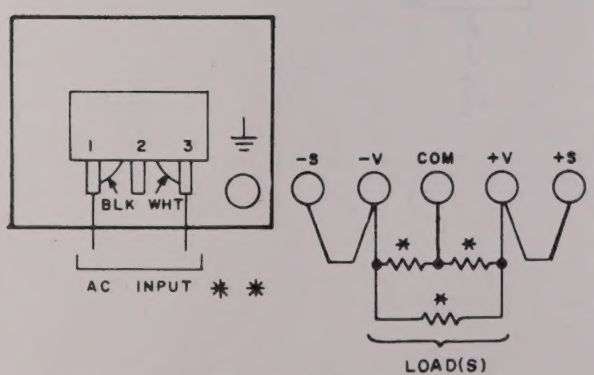
1 2 3
BLK WHT
AC INPUT * *
-S -V COM +V +S
LOAD(S)
* LOAD(S) CAN BE CONNECTED IN ANY CONFIGURATION.
* * AC INPUT CONNECTION SHOWN IS FOR 105-125VAC
FOR 210-250V INPUT, DISCONNECT BLK & WHT TRANFORMER
LEADS FROM TERMS 1&3 AND RECONNECT BOTH LEADS TO
TERM 2

Figure 3. Local Sensing Connection

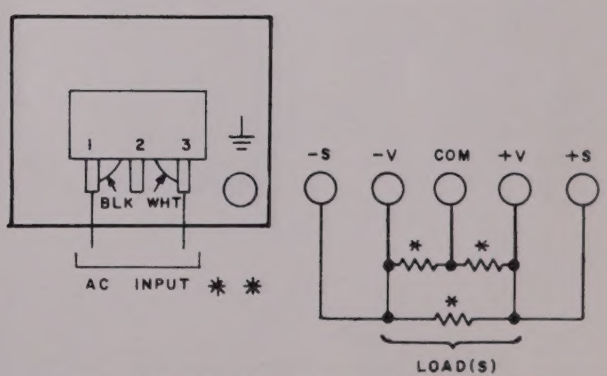
1 2 3
BLK WHT
AC INPUT * *
-S -V COM +V +S
LOAD(S)
* LOAD(S) CAN BE CONNECTED IN ANY CONFIGURATION.
* * AC INPUT CONNECTION SHOWN IS FOR 105-125VAC
FOR 210-250V INPUT, DISCONNECT BLK & WHT TRANFORMER
LEADS FROM TERMS 1&3 AND RECONNECT BOTH LEADS TO
TERM 2

Figure 4. Remote Sensing Connection

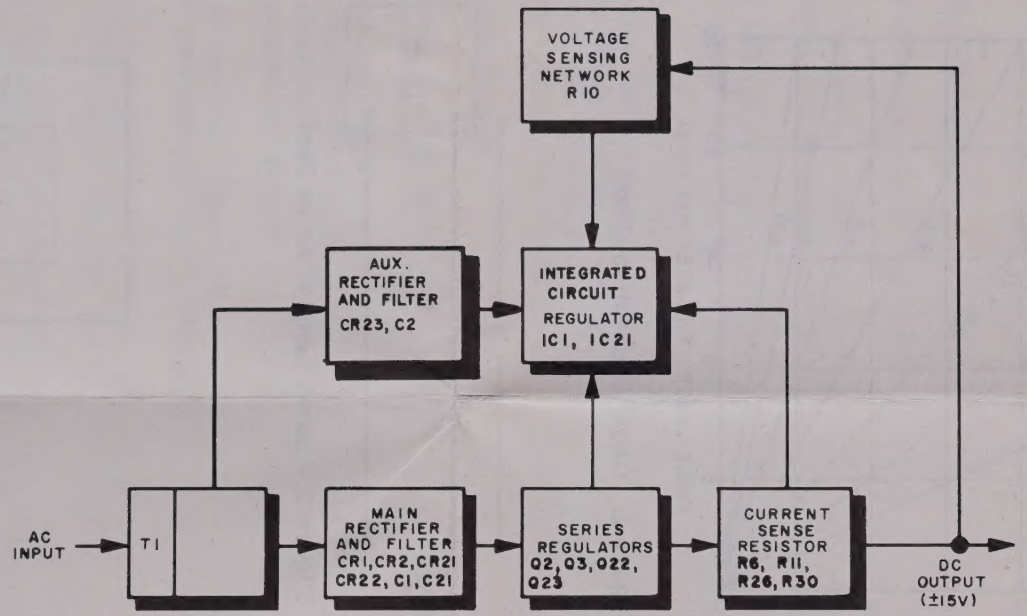
VOLTAGE SENSING NETWORK R10
AUX. RECTIFIER AND FILTER CR23, C2
INTEGRATED CIRCUIT REGULATOR IC1, IC21
AC INPUT
T1
MAIN RECTIFIER AND FILTER CR1, CR2, CR21 CR22, C1, C21
SERIES REGULATORS Q2, Q3, Q22, Q23
CURRENT SENSE RESISTOR R6, R11, R26, R30
DC OUTPUT (±15V)

Figure 5. Typical Block Diagram.

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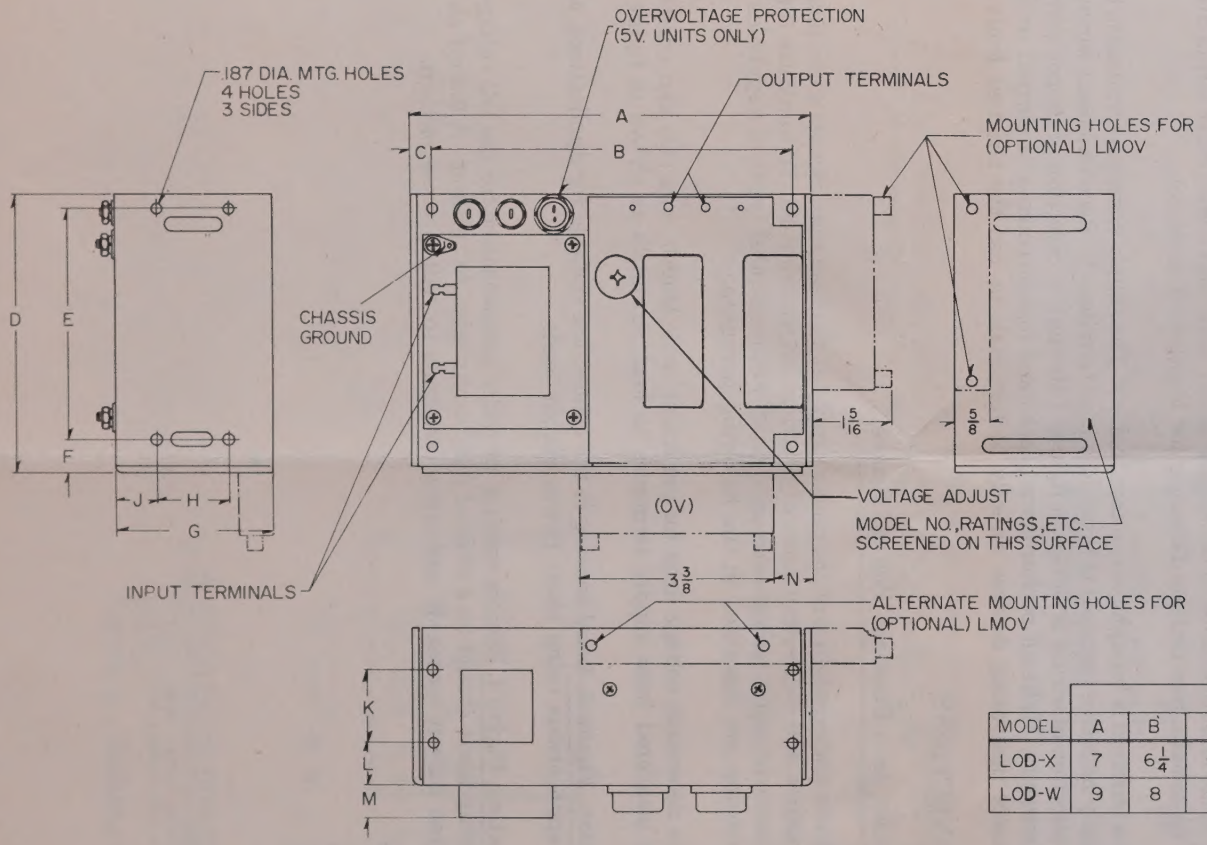


| MODEL | DIMENSIONS | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | G | H | J | K | L | M | N |
| LOD-X | 7 | 6 1/4 | 3/8 | 4 7/8 | 4 1/8 | 1/2 | 2 3/4 | 1 1/4 | 3/4 | 1 1/4 | 3/4 | 1/2 | 7/16 |
| LOD-W | 9 | 8 | 1/2 | 4 7/8 | 4 1/8 | 1/2 | 2 3/4 | 1 1/4 | 3/4 | 1 1/4 | 3/4 | 9/16 | 1 1/4 |

Outline Drawing.